Determinants of Bushmeat Traders' Income in Itu, Akwa Ibom State, Nigeria

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Abstract:

This study assessed the factors affecting bushmeat trade in Itu, Akwa Ibom State, Nigeria. Data was obtained through detailed structured questionnaires was randomly administered to 150 respondents from 10 communities randomly selected. Descriptive statistics and econometric model were employed to analyze the data collected. The results obtained indicated that majority of the respondents were male (54.93%), married (76.76%), aged between 21-40 years (80.99%) and literate (68.31%). Cross River State was the major (38.73%) single source of bushmeat for the traders. Only six species of bushmeat were traded in the area and grasscutter was the most demanded and supplied bushmeat species. Majority (37.33%) of the traders earned between ₦15,100 - ₦20,000 income monthly. Gender, age, educational status, species traded and sources of bushmeat traded were positive and significant factors (p<0.01) that affected the income of the traders. The study recommends more investment and development in the rural areas as this further help in reducing dependence and trade in the wildlife resources thereby conserving it for posterity.

1. Introduction

Bushmeat is an important NTFP throughout sub-Saharan Africa, worth millions of dollars in trade [1,2,3,4]. It offers a number of benefits to forest-dwelling populations as it is an easily traded resource, transportable, has a high value/weight ratio and is easily preserved at low cost [2]. It also represents both the primary source of animal protein and cash-earning commodity for rural communities [5,6,7]. According to [2], rural people moving from a subsistence lifestyle to a cash economy have relatively few options for generating income, hence, without access to capital, land or livestock, harvesting of wildlife resources offer them the best return for their labour input. Around protected areas, even when the people are aware of the illegality of their trade, they are compelled to continue because bush-meat trade is their basic means of

livelihoods. This situation has caused restriction of business in some areas to be carried out in the early hours of market days to avoid arrests and possible persecution [8].

The growing demand for bushmeat can be attributed to the high demand from the urban centres and more generally the increasing population who consume it in restaurants and homes, often far from the forest. These products are increasingly being drawn from forested areas into towns and cities as a result of its preference, inexpensive [2,9], higher protein content and the fact that bush-meat contain less fat than domestic meat with potentials to supply iron, Vitamins A and B [10]. This therefore suggests a link between NTFP harvest and human wellbeing, which has gained increasing attention in conservation, development and policy circles [11] and among funding bodies [12].

Revenue derived from the sale of wildlife products can be highly variable, even when the same resource category is considered. While those products destined for international markets fetch much higher prices than locally consumed goods and the unit value of wild meat is low, the returns from hunting are generally higher than average local wages [13,14,15]. However, issues still arise on the importance or contribution of wildlife to rural livelihood [3]. These issues are based on the notion of uncertainty if sustainable wildlife harvest can generate sustainable income to lift rural livelihoods from poverty [16,17,18] and that most evidence about the importance of bushmeat in rural livelihoods is primarily derived from studies conducted in environments with abundant wildlife and with few alternative opportunities for earning income [3].

Few bushmeat studies have been conducted among households living within a faunally-depleted environment [19] regarding the determinants of bushmeat, income to households. Where attempts have been made to record socio-economic household characteristics [20], it seems that the importance of bushmeat continues to be higher in chronically poor households, and in households with temporarily low income. This study is therefore aimed at improving our understanding of the factors affecting income from bushmeat among rural households in the study area.

2. Materials and Methods

2.1. Study Area

The study was conducted in Itu Local Government Area (LGA) of Akwa Ibom State, Nigeria. Itu is located on 5°10′0″N7°59′0″E in the South-South of Nigeria and is a Local Government Area of Akwa Ibom State. The Local Government Area occupies a landmass of approximately 606.1 0 square kilometers. It is bounded in the North and North-East by Odukpani in Cross River State and Arochukwu in Abia State, in the West by Ibiono Ibom and Ikono Local Government Areas, in the South and South East by Uyo and Uruan Local Government Areas, respectively. The people in the support zone communities are mainly subsistence farmers and engaged primarily in farming, hunting, fishing and craft making.

2.2. Sampling and Data Collection

Data for the study was generated from both primary and secondary sources. The primary data was obtained using structured questionnaires, oral interview and direct observation while the secondary data was collected mainly from available literatures

relevant to the study. The questionnaire was pre-test in order to ensure that the questions reflect the true objective of the study and necessary corrections were made for clarity. Simple random sampling technique was used to select ten (10) communities representing 13.5 percent of the communities in Itu LGA from the 74 communities in the area. The selected communities were; Ikot Nsuk, Ikot Esia, Mbiabong Itiam, Ekit Itam, Ikot Andem, Ikot Ukap, Nkim Itam, Ikot Anyam, Nung Ukot Itam and Obong Itam. Fifteen questionnaires were randomly administered among bushmeat traders identified in each of the community making a total of 150 respondents. However, only 142 valid and completed questionnaires were used for the analysis.

2.3. Data Analysis

The data obtained was subjected to descriptive and inferential analyses. The descriptive analysis involved the use of means, frequency, percentage and bar chart, while the inferential statistical analysis involved the use of regression. The regression analyses (Ordinary Least Square (OLS), Double-Log, Semi-Log and Exponential) were employed to determine the factors affecting income generation among the bushmeat traders in the study area. They were also used to measure the amount of variability of the dependent variable that could be explained by the independent variables. The explicit form of equations as used by   is given as:

a.   OLS regression model

$$y = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + \ldots\ldots\ldots + b_6X_6 + \mu \qquad (1)$$

b.   Double Log Regression model

$$log\ y = a + b_1logX_1 + b_2logX_2 + b_3logX_3 + \ldots\ldots\ldots + b_6logX_6 + \mu \qquad (2)$$

c.   Semi-Log Regression model

$$y = a + b_1logX_1 + b_2logX_2 + b_3logX_3 + \ldots\ldots\ldots + b_6logX_6 + \mu \qquad (3)$$

d.   Exponential Regression model

$$\log_\mu y = \log_\mu a + b_1X_1 + b_2X_2 + b_3X_3 + \ldots\ldots\ldots + b_6X_6 + \mu \qquad (4)$$

Where,

y= Total annual revenue from the forest (₦);a = constant; bi, where i =1, 2...6 were the regression coefficients of X_i variable, X_1 = Gender of trader (Male = 1; female = 0);X_2 = Age of trader (years);X_3 = Occupation of trader (Full-time = 1, Part-time = 0);X_6 = Species traders (number); X_6 = Source of bushmeat traded (number);μ = factors that were not adequately accounted for but contributed to total revenue.

The *a priori* expectations of the changes in variables X_1 to X_6 on output (revenue) are indicated in Table 1.

Table 1.*The a priori expectations of the changes in variables.*

Determinant	Variable	Input	Output	Explanations of the relationship
Gender of trader	X_1	+	+	Increase in male traders would generate more income than female traders.
Age of trader	X_2	+	+	Increase in age would result in increased income generation.
Occupation of trader	X_3	+	+	Increase in full-time operators would increase income.
Educational status	X_4	+	+	Increase in educational status would

				increase income
Species traded	X_4	+	+	Increase in species traded would increase income
Sources of bushmeat	X_5	+	+	Increase in bushmeat sources would decrease revenue generation

+ = increase in input/output; - = decrease in input/output

3. Results and Discussion

3.1. Demographic Characteristics of Respondents

The result of the study in Figure 1 showed that majority of bushmeat traders (54.93%) were male and 45.07% were female. The dominance of the male counterparts in the business could be attributed to the arduous nature of the business, were men were mainly the hunters and also partook in the trading as wholesaler, retailer, including owning the bar or restaurant [22,23,24].

The age of the respondents in the study areas ranged from less than 20 years to above 40 years (Figure 1). However, about 80.99% of the traders were between 21 and 40 years of age, while 7.04% and 11.97% were respectively below 20 years and above 40 years. The dominant age range composed of youths. The predominance of young people in bushmeat could be attributed to the laborious nature of the business, requiring young, agile and energetic traders, capable of processing the hunted animal for marketing and consumption. Also, the low level of industrialization, lack of alternative source of livelihood apart from exploitation of the wildlife resources could be attributed to the involvement of active able body men and women in the trade. This is in accordance with the observation of [5,6,7,25,26,27] that in an attempt of communities to survive in their poverty-stricken state, they ultimately exploit the environmental capital base for their livelihood.

Also, 76.76% of the respondents were married, while 21.83% were single and 2.11% widowed. This is an indication that majority of the respondents have families with a burden to cater for them, thus placing a huge demand on them to trade more bushmeat to generate enough income for the upkeep of their families. This conclusion is supported by [4] that larger family sizes appeared to generate a greater need for income, which may be most accessible through hunting or trading, particularly for individuals from families with experienced hunters or bushmeat trading.

Figure 1 also indicates that occupationally, majority (41.56%) of the respondents were retail bushmeat traders, followed by bar/restaurant operators and wholesalers with 32.39% and 14.08% respectively. The hunters made up 11.97% of the respondents who traded on bushmeat products. This value indicates a pressure on the wildlife resource of the area for more meat products considering the rate of exploitation in an unsustainable manner. With no developmental project or alternative livelihood, exploitation pressure that is mounted on the wildlife resources is ever on the increase. As the pressure continues to heighten with the growing population and limited resources, the environmental crisis level will also increase, thus resulting in direct conflict with conservation policies for available wildlife resources which according to the people believe is the only source of their livelihood available to exploit freely [26,28,29,30,31].The result is in accordance with [32] who reported that bushmeat was the major source of income for 59% of men in rural Equatorial Guinea. This however contrasts with other studies, which show that income diversification is

widespread in rural areas, and that the importance of farm income and nonfarm income, of which bushmeat is a part, varies greatly across localities [33, 34].

Educationally, 68.31% of the respondents had formal education (Figure 1). A further breakdown of the data showed that 9.16% of the respondents had primary education (FSLC), while 42.25%, 15.49% and 1.41% of the respondents had acquired secondary (SSCE/GCE) and tertiary education (NCE/OND and HND/Degree) respectively. Formal education according to [26] and [35] has the potential for making up of some of the deficiency in non-formal education and positively influencing the adoption of innovation. With the respondents' level of education, they possess the ability to participate effectively in livelihood enhancement strategies and empowerment programmes decisions that will ensure sustainable conservation of natural resources while also meeting their livelihood needs in addition to keeping proper records and this may positively impact on their marketing practices. Our observation also agrees with [4] indicating that individuals with higher education levels although not necessarily having a higher income, has a lower probability of hunting. However, they may engage in activities or in other commitments that generate extra income.
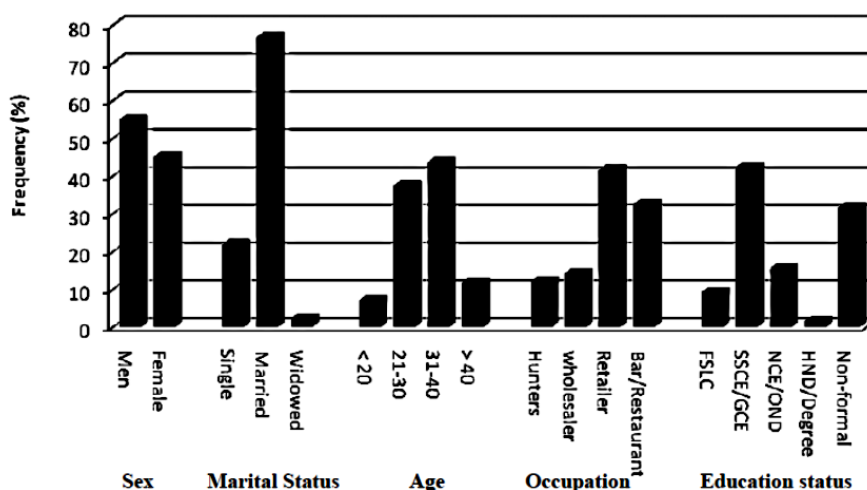

Figure 1. Demographic characteristics of the respondents.

FSLC – First School Leaving Certificate, SSCE/GCE – Senior Secondary School Certificate Examination/General Certificate Examination, NCE/OND – National Certificate of Education/Ordinary National Diploma, HND – Higher National Diploma

3.2. Sources of Bushmeat in the Study Area

Over 87.32% of the bushmeat traded in the study area where not from the study area (Figure 2). About 48.59% of the bushmeat where obtained from other sources such as neighboring villages and farms where species such as grasscutters and giant rats were reared. Cross River State happens to be the major (38.73%) single source of bushmeat for the traders, while the study area (Itu LGA) contributed 12.68% of the species traded in the area. This is in accordance with [8] who reported buyers from Itu travelling as far as Oban main market, Aningeje market and Mangor bush market in Cross River State to buy bushmeat. Since these three are weekly markets and are operated on separate days of the week, most of the traders are able to patronize each of these markets on rotational basis (8).
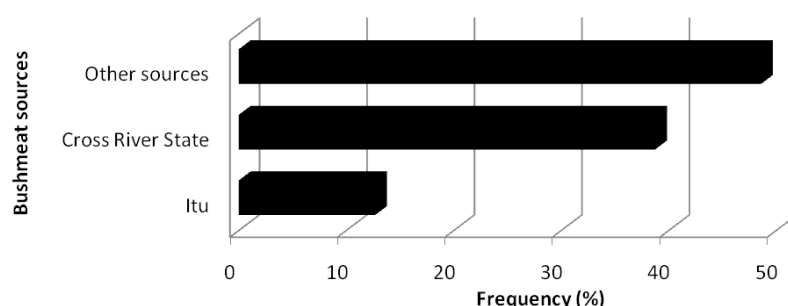
Figure 2. *Sources of bushmeat for trading in Itu Local Government Area, Akwa Ibom State.*

3.3. Demand and Supply of Bushmeat

Grasscutter was the most demanded (40.85%) bushmeat species, and then followed by antelope (19.01%) and porcupine (14.71%) respectively. Deer, duiker and giant rat all had a demand that were less than 10% respectively (Figure 3). Also, grasscutter was the most supplied (42.95%) bushmeat species. Giant rat (17.61%) and duiker (11.26%) was the second and third most supplied bushmeat species followed by antelope (10.57%) and porcupine (9.16%), while deer was the least (8.45%) supplied bushmeat species. There was also a strong correlation (0.86) between the supply and demand of bushmeat in the study area.

The few number (6) species traded in the study area is lower than 18 mammalian species reported in Rivers State in 1995 by NDES (undated), 21 in Cross River State [8] and 12 in Rivers State [36], thus showing a decrease in species diversity traded. Increase in demand is usually associated with scarcity, low cost and preference, while decrease in demand is attributed to scarcity and legal restrictions [37]. Voluntary factors like increased conservation awareness, people refusal to buy based on their reason and change in preferences are also cited as explanatory factors for reduced bushmeat demand. The non-demand and supply for primate species in the study area is as a result of the local tradition of the people in the area who consider hunting and consumption of certain primate species a taboo [26,27,38,39], hence consumers of primate species from neighboring localities who demand for as a delicacy or for medicinal purposes cannot get their supply within the area. The high demand for grasscutter in the study area is in contrast with [10] reports that wild meat demands tends on a large extent to be focused on large game species such as antelopes and deer. The high demand and supply of grasscutter over other bushmeat species in the area indicates the high preference for the bushmeat due to its availability as a result of its high reproductive rate, with a very short gestation period and a litter size of 2-6 [40], restriction to secondary forests grassland/cassava farms, their sociality and restricted home range increase their susceptibility to being hunted since they are more conspicuous and have a limited ranging area which makes their movements more predictable [41] than porcupine [4]. Also, its supply was able to meet the demand of the area and exceed it because some of the species (grasscutter and giant rats) were also domesticated in the area and neighboring localities unlike antelope, deer and duikers which are not domesticated. This is in accordance with [42] observation that the supply of bush meat from wild sources alone cannot possibly bridge the gap between bushmeat production and human population growth. According to [8], the number of bulk buyers for larger bushmeat (e.g. antelope, deer and duikers) far out strips the sellers and bushmeat brought to the market, making demand very strong and leading to rising prices. Thus, most of these traders are not able to afford the prices making the bushmeat product readily available for sale in the study area. Also, habitat

destruction and unsustainable exploitation of the larger mammals could probably be responsible for their low numbers being traded in the study area.
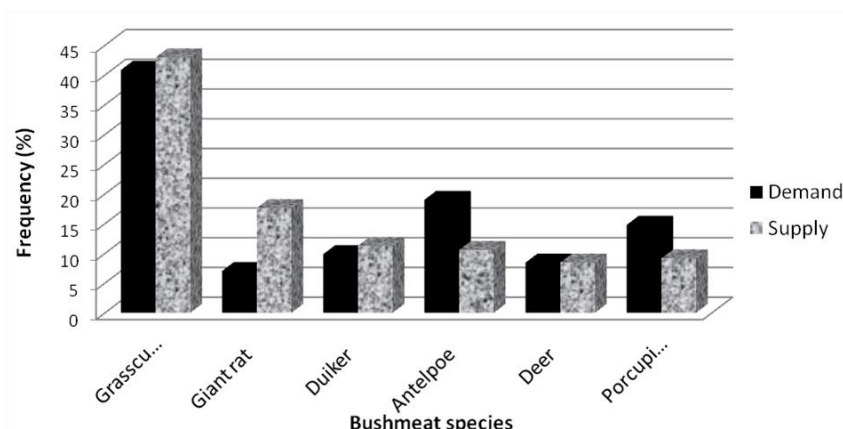

Figure 3. Demand and supply of bushmeat in Itu Local Government Area, AkwaIbom State.

3.4. Monthly Income of Bushmeat Traders

One of the most important variables of the socio-economic status of a person is his/her level of income (Coleman, 1983). Majority (37.33%) of the traders earned between ₦15,100 - ₦20,000 income monthly, followed by 25.35% and 14.79% who earned between ₦10,100 - ₦15,000 and ₦5,000 - ₦10,000 respectively monthly, while only 2.81% of the respondents earned above ₦30,000 monthly. This is an implication that the business is profitable and a reliable means of livelihood for the traders. The fact that majority of the respondents earn between ₦15,100 - ₦20,000 income monthly could be attribute to the species traded by the respondents. According to [8], the buyers and sellers have a fairly uniform price for all the types (whole carcasses, half carcasses, fresh carcasses, partially smoked carcasses and completely smoked and dried carcasses) and for every animal species that comes to the market. Serious bargaining is only noticed when a strange animal is brought or an animal that is not commonly eaten e.g. snakes. Thus, every species e.g. Grass cutter (*Thryonomis swiderianus*), Brush – tailed Porcupine (*Atherurus africana*) have an almost standard range of price depending on the size. A slight difference in price would only arise from the bargaining power of the buyer and the resistance of the seller. The few traders who earned above ₦30,000 monthly were traders who also doubled as hunters. This could be attributed to the lower cost they incur in acquiring the species they traded. They usually do not incur the cost of transportation to the market and other substantial costs which are built-in to the wildlife products sold in the market place by the traders.
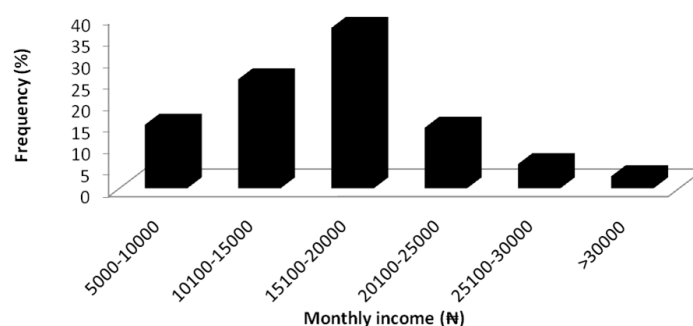

Figure 4. Monthly income of bushmeat traders in Itu Local Government Area, Akwa Ibom State.

3.5. Determinants of Income of Bushmeat Traders in the Study Area

As shown in Table 1, the Double-log model appeared as the best fit model as it had the highest number of significant variables with appropriate theoretically expected signs and the highest value of the coefficient of multiple determinations (R^2). The R^2 value was 0.975, indicating that the regressors included in the model explained about 97.50% of the variations in income among the bushmeat traders. The F-Statistic of 887.81was highly significant at $p < 0.01$ indicating that the regressors included in the model impacted significantly on the total revenue among the traders. Occupation of the trader was the only variable in the model that was not significant ($p < 0.10$).

Gender (X_1) had a positive coefficient (2.30) and was significance at $p < 0.01$, conforming to the *a priori* expectation. The positive sign implied that more male trader earns more revenue from bushmeat trade than female traders. This could be attributed to the role played by most male traders in the study area. Most of the male traders also double as hunters to acquire wildlife products for sale. In the study area, it is a taboo for women to engage as hunters; hence they have to incur cost of acquiring products for sale which inadvertently affect their income. This is in accordance with [3] and [43] observation that cultural norms prevented women from setting traps themselves and checking traps in forests where most bushmeat are harvested.

The coefficient for age (X_2) was positive (1.15) and significant ($p < 0.01$), and in conformity with *a priori* expectation that increase in age of trader would increase income of trader. This implies that as the trader ages, he acquires more experience in the trade in other to be able to overcome some of the challenges in the business, thereby improving or increasing his income. This is particularly true for young traders who are still in their active age which places them at advantage over the aged in shuttling around to make effective transactions [44].

The coefficient for the educational status variable (X_4) was positive (0.08) and significant ($p < 0.10$). The variable conformed to the *a priori* expectation. This implied that an increase in the level of educational attainment of a trader, every other variable held constant, would result in an increase in the output and hence income of the trader. This is in accordance with [45] observation that there is a clear and well-defined relationship between education and earnings.

The coefficient for species traded (X_5) was positive (0.05), significant ($p < 0.01$) and in conformity with *a priori* expectation that increase in number of number of species traded would lead to a corresponding increase in the income of the bushmeat traders. The higher the number of species traded increases the likelihood of the trader having more sales than one with a single species. This is attributed to the price difference in each of the species traded and the income level of available buyers. Species such as antelope, deer and duikers are very costly and unaffordable by majority of the rural buyers; hence traders who deal in only these species have a hard time selling than those who also deal on other cheaper species (grasscutter, cane rate and porcupine) that are easily affordable and patronized by the rural people.

The coefficient for sources of bushmeat traded (X_6) was also positive (0.25), significant ($p < 0.01$) and in conformity with *a priori* expectation. This implied that the source from which the bushmeat traded were obtained greatly influenced the total revenue of the trader and in this case positively. Traders who are also hunters tend to gain more income from the trade than non-hunters traders who only purchase from the market or hunters. Also, bushmeat prices increase with proximity to urban areas and

hunters who harvest game meat nearer cities gain relatively more from selling their catch. This is in accordance with [46] observation that prices of bushmeat increased with increasing distance from the hunting areas. The hunter-trader gains more profit from the trade as he does not incur the purchase cost of the wildlife to be traded but only the time spent in hunting, therefore the sales from the trade is totally without cost. The non-hunter trader incurs a lot of cost in acquiring the wildlife product for sale most especially where he has to travel a far distance to obtain the product. This influences his revenue as he has to building the cost into the price for which he has to sell the product. In cases, where he has to compete with the hunter-trader for the available market, he tends to gain far less than the former because his price has to be comparative in order to make sales.

Table 2. *Determinants of bushmeat trade in the study area.*

Parameters	OLS	++Double-Log	Semi-Log	Exponential
Intercept	-5711.5 (1642.13)***	2.295788 (0.07)***	-59827.3 (3700.26)***	1768.35 (0.12)***
Gender	114.965 (537.93)	0.125531 (0.04)***	-5112.3 (2223.11)***	1.28 (0.04)***
Age	617.373 (23.91)***	1.154453 (0.05)***	52940.2 (2724.89)***	1.03 (0.00)***
Occupation	-692.172 (393.24)*	-0.05661 (0.06)	-6283.75 (3295.82)**	1.02 (0.03)
Education	285.4002 (67.22)***	0.081193 (0.02)***	2707.344 (1274.14)**	1.02 (0.01)***
Species traded	223.392 (75.13)***	0.050987 (0.01)***	144.7641 (643.52)	1.03 (0.01)***
Sources of bushmeat	430.0613 (337.28)	0.247134 (0.03)***	-4343.19 (1840.99)**	1.27 (0.03)***
F-Ratio	677.02***	887.81***	366.30***	534.88***
R^2	0.967	0.975++	0.942	0.960

***, ** and * represent 1%, 5% and 10% significance levels respectively. Figures in parenthesis are t-ratios. ++ = lead model

3.6. Problems of Bushmeat Trade

The most common problem or challenge of majority (21.12%) of the respondents the study area was the seasonal nature of wildlife product and supply respectively. This was followed by difficulty in processing and preserving the wildlife carcases (19.74%) and high cost of transportation (11.98%) to the bushmeat market or producers (hunters) home. Capital for the business was not considered as a major challenge in the trade as it was ranked as the fourth problem. Other challenges that they encountered in the trade included local belief (8.45%) and individual differences in the choice of bushmeat they consumed (Figure 5).

The inadequate supply and seasonality of wildlife to meet the demand of the trade could be as a consequent of unsustainable exploitation of wildlife resources, wildlife habitat destruction through deforestation [27, 39] and the far distance to needed by the hunter to hunt. Also, the decrease in the number of hunters, availability of alternative livelihood and a decline in wildlife numbers coupled with increasing distances between wildlife habitat and villages have decreased incentives to hunt. With lower returns per hunt, some could turn to the alternatives. Those who continue to hunt do so out of necessity hunting at night and setting traps in both the forest and on their farms or strictly on their farms. The poor processing or preservation of bushmeat by

trader is also a major problem coupled with the high cost of transportation to purchase these products. Virtually all the respondents preserved their bushmeat by smoking. According to [47] and [48], food preservation is one of the central problems faced by developing countries, resulting in spoilage of large quantities of products due to inadequate infrastructure, insufficient processing capacities, and growing marketing difficulties. Also, low patronage/usage of cold storage by traders is attributed to irregular electricity supply, and the provision of a cold chain or store rooms for cooling of produce is almost impossible considering the huge financial implication of running them. Local belief and individual differences in the type of bushmeat consumed and traded in the study area also part of the challenges. The study area is known for not consuming primate species; hence they are considered a sacred species and not exploited or traded in the area [39, 49].
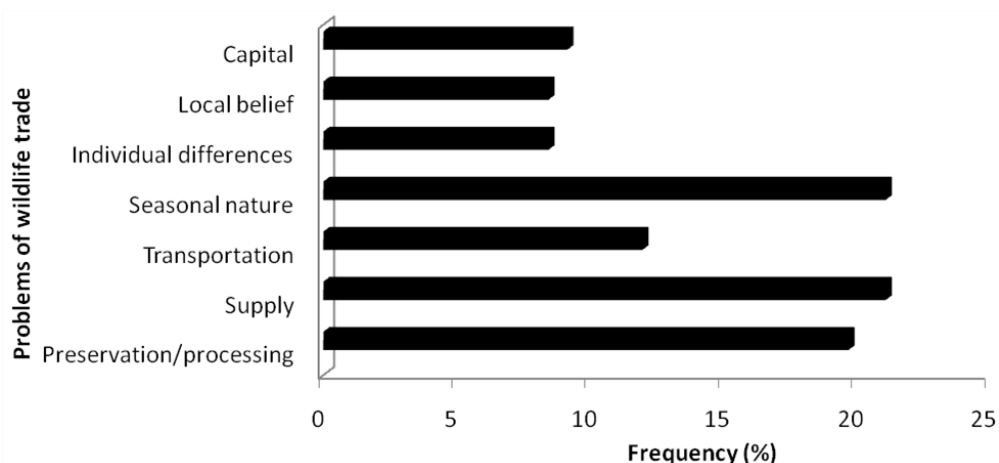

Figure 5. *Problems of bushmeat trade in Itu Local Government Area, Akwa Ibom State.*

4. Conclusions

The study shows that bushmeat trade is a profitable livelihood activity in the study area. Most of the species traded were obtained from neighboring Cross River State and from the wild. Grasscutter is the most demanded and supplied meat as it also domesticated in the area. Socio-economic factors such as gender of the trade, age, number and sources of species traded influence the total income of the traders in the study area. Considering the demand and supply of wildlife meat in the study area due to seasonality of some of the products and supply, the study recommends that greater attention should be paid in education and training the people of the area on alternative sourcing of product such as domestication of species that are easy to breed in captivity and improvement in livelihood activities of the people as this will help in reducing the pressure of depending and extracting of bushmeat from the forests.

Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this article.

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